Applied Mathematics and Computer Science

Introduction

The role of mathematics in our highly scientific-technological society is basic and essential. Mathematical thought and modeling are valued tools in our sophisticated industrial community. The application of mathematics to industry and business to meet society's need is increasing. This growth and demand continues to create a need for graduates with training in Applied Mathematics and Computer Science.

The Applied Mathematics and Computer Science program prepares graduates for careers in a variety of fields by providing a foundation in mathematics, computer science, and statistics, complemented with additional courses specified by the selected concentration. Students may choose a concentration in Actuarial Science, Bioinformatics, Business Management, Information Assurance and Cyber Security, Software Development, or students may tailor their coursework to provide knowledge that will prepare them for a career path of their choice.

Students will enhance their studies and gain significant hands on experience through a capstone course or cooperative education experience. On campus, there are also opportunities in undergraduate research, tutoring, and other technical openings to enrich the educational experience.

In addition to fulfilling the university's basic admissions requirements, Applied Mathematics and Computer Science applicants must also graduate in the top 50 percent of their class, or for high schools that do not rank, have a cumulative grade point average of at least 3.00 on a 4.0 scale and have a minimum ACT composite score of 22 (*SAT Math 510*).

In fulfilling the necessary competencies for a degree, a student may complete the requirements for a minor in Business Administration, Economics, or Technical Writing. It is the student's responsibility to obtain approval for the minor from the department offering it.

Program Requirements for the program without a Concentration

Total for Graduation	120 credits
General Education	41-42 credits
Major Studies	78-79 credits

Program Requirements

General Education

41-42 credits required

A. Communication Skills — 8 credits

ENGL-101	Freshman English – Composition *or*	
ENGL-111	Freshman English – Honors I	3
ENGL-102	Freshman English – Reading and Related Writing *or*	
ENGL-112	Freshman English – Honors II	3
SPCOM-100	Fundamentals of Speech	2

B. Analytic Reasoning — 7-8 credits

CS-144	Computer Science I	3
MATH-153	Calculus I *or*	
MATH-156	Calculus and Analytic Geometry I	4-5

C. Health and Physical Education — 2 credits

Courses must be from areas of health, physical education or nutrition.

D. Humanities and the Arts — 9 credits

Courses must be from three areas including creative arts, history, literature, music appreciation, performing arts and philosophy.

E. Social and Behavioral Sciences — 9 credits

Courses must be from three or more areas including anthropology, economics, geography, political science, psychology and sociology.

F. Natural Sciences (with Lab) — 4 credits

G. Technology — 2 credits

Major Studies

78-79 credits required

Mathematics, Statistics and Computer Science Foundation — 32-33 credits

CS-145	Computer Science II	3
CS-244	Data Structures	4
MATH-154	Calculus II or	
MATH-157	Calculus and Analytic Geometry II	4-5
MATH-158	Calculus III	3
MATH-180	Foundations of the Language of Mathematics	4
MATH-275	Linear Algebra	3
MATH-370	Modern Algebra I	3
MATH-450	Real Analysis I	3
MSCS-449	Applied Mathematics: Co-op Education Internship	2
STAT-331	Probability and Mathematical Statistics I	3

Selective Courses — 45 credits

The proposed program plan must be approved by the program director at least four semesters prior to graduation. The plan must indicate career path and courses that support that career. The plan may include a minor or a second major.

Professional Investigation/Exposure

Students must attend at least one professional event per semester for two years. See adviser.

Program Requirements for the Actuarial Science Concentration

Total for Graduation ..... 120 credits
General Education ..... 41-42 credits
Major Studies ..... 77-78 credits

Program Requirements

General Education

41-42 credits required

A. Communication Skills **8 credits**

ENGL-101 Freshman English – Composition *or*
ENGL-111 Freshman English – Honors I 3
ENGL-102 Freshman English – Reading and Related Writing *or*
ENGL-112 Freshman English – Honors II 3
SPCOM-100 Fundamentals of Speech 2

B. Analytic Reasoning **7-8 credits**

CS-144 Computer Science I 3
MATH-153 Calculus I *or*
MATH-156 Calculus and Analytic Geometry I 4-5

C. Health and Physical Education **2 credits**

Courses must be from areas of health, physical education or nutrition.

D. Humanities and the Arts **9 credits**

Courses must be from three areas including creative arts, history, literature, music appreciation, performing arts and philosophy.

E. Social and Behavioral Sciences **9 credits**

ECON-210 Principles of Economics 3

Courses must be from three or more areas including anthropology, economics, geography, political science, psychology and sociology.

F. Natural Sciences (with Lab) **4 credits**

G. Technology **2 credits**

Major Studies

78-79 credits required

Required Mathematics/Statistics **34-35 credits**

MATH-154 Calculus II or
MATH-15 Calculus and Analytic Geometry II 4-5
MATH-158 Calculus III 3
MATH-180 Foundations of the Language of Mathematics 4
MATH-255 Differential Equations 3
MATH-275 Linear Algebra 3
MATH-370 Modern Algebra I 3
MATH-450 Real Analysis I 3
MSCS-449 Applied Mathematics: Co-op Education Internship 2
STAT-331 Probability and Mathematical Statistics I 3
STAT-332 Probability and Mathematical Statistics II 3
STAT-440 Advanced Linear Modeling-Regression and Time Series Analysis 3

Required Related Fields **16 credits**

CS-145 Computer Science II 3
CS-244 Data Structures 4
ECON-215 Principals of Economics II 3
ENGL-320 Business Writing *or*
ENGL-415 Technical Writing 3
MSCS-446 Numerical Analysis I 3

Selective Courses **27 credits**

Remaining courses are chosen from a list of actuarial science selectives provided by the program director.

Professional Investigation/Exposure

Students must attend at least one professional event per semester for two years. See adviser.

Program Requirements for the Bioinformatics Concentration

Total for Graduation	120 credits
General Education	42- 43 credits
Major Studies	76-77 credits

Program Requirements

General Education

42-43 credits required

A. Communication Skills — 8 credits

ENGL-101	Freshman English – Composition *or*	
ENGL-111	Freshman English – Honors I	3
ENGL-102	Freshman English – Reading and Related Writing *or*	
ENGL-112	Freshman English – Honors II	3
SPCOM-100	Fundamentals of Speech	2

B. Analytic Reasoning — 7-8 credits

CS-144	Computer Science I	3
MATH-153	Calculus I or	
MATH-156	Calculus and Analytic Geometry I	4-5

C. Health and Physical Education — 2 credits

Courses must be from areas of health, physical education or nutrition.

D. Humanities and the Arts — 9 credits

Courses must be from three areas including creative arts, history, literature, music appreciation, performing arts and philosophy.

E. Social and Behavioral Sciences — 9 credits

Courses must be from three or more areas including anthropology, economics, geography, political science, psychology and sociology.

F. Natural Sciences (with Lab) — 5 credits

CHEM-135	College Chemistry I	5

G. Technology — 2 credits

BIO-210	Concepts and Issues in Biotechnology	2

Major Studies

77-78 credits required

Mathematics, Statistics and Computer Science Foundation — 38-39 credits

MSCS-2XX	Introductory Bioinformatics	2
CS-145	Computer Science II	3
CS-244	Data Structures	4
CS-248	Web and Internet Programming	3
CS-443	Database Systems Manipulation and Design	3
MATH-154	Calculus II or	
MATH-157	Calculus and Analytic Geometry II	4-5
MATH-158	Calculus III	3
MATH-180	Foundations of the Language of Mathematics	4
MATH-275	Linear Algebra	3
MSCS-492	Math and Computational Foundations of Bioinformatics	3
STAT-331	Probability and Mathematical Statistics I	3
STAT-332	Probability and Mathematical Statistics II	3

Required Science — 23 credits

BIO-136	College Molecular Cell Biology I	5
BIO-235	Molecular Cell Biology II	4
BIO-370	Biotechnology	3
BIO-493	Bioinformatics Practicum	3
CHEM-201	Organic Chemistry I	4
CHEM-311	Biochemistry	4

Selective Courses — 15 credits

Remaining courses are chosen from a list of bioinformatics selectives provided by the program director.

Professional Investigation/Exposure

Students must attend at least one professional event per semester for two years. See adviser.

Program Requirements for the Business Management Concentration

Total for Graduation ..... 120 credits
General Education ..... 41-42 credits
Major Studies ..... 77-78 credits

Program Requirements

General Education

41-42 credits required

A. Communication Skills — 8 credits

ENGL-101 Freshman English – Composition *or*
ENGL-111 Freshman English – Honors I 3
ENGL-102 Freshman English – Reading and Related Writing *or*
ENGL-112 Freshman English – Honors II 3
SPCOM-100 Fundamentals of Speech 2

B. Analytic Reasoning — 7-8 credits

CS-144 Computer Science I 3
MATH-153 Calculus I *or*
MATH-156 Calculus and Analytic Geometry I 4-5

C. Health and Physical Education — 2 credits

Courses must be from areas of health, physical education or nutrition.

D. Humanities and the Arts — 9 credits

Courses must be from three areas including creative arts, history, literature, music appreciation, performing arts and philosophy.

E. Social and Behavioral Sciences — 9 credits

ECON-210 Principles of Economics I 3

Remaining courses must be from two or more areas including anthropology, geography, political science, psychology and sociology.

F. Natural Sciences (with Lab) — 4 credits

G. Technology — 2 credits

Major Studies

78-79 credits required

Mathematics, Statistics, and Computer Science Foundation — 38-39 credits

CS-145 Computer Science I 3
CS-244 Data Structures 4
MATH-154 Calculus II *or*
MATH-157 Calculus and Analytic Geometry II 4-5
MATH-158 Calculus III 3
MATH-180 Foundation of Language of Mathematics 4
MATH-275 Linear Algebra 3
MATH-370 Modern Algebra I 3
MATH-450 Real Analysis I 3
MSCS-446 Numerical Analysis I 3
MSCS-449 Applied Mathematics: Co-op Education Internship 2
STAT-331 Probability and Mathematical Statistics I 3
STAT-332 Probability and Mathematical Statistics II 3

Required Business and Related Courses — 21 credits

BUACT-206 Introduction to Financial Accounting 3
BUACT-207 Introduction to Corporate and Managerial Accounting 3
BUACT-340 Business Finance 3
BUMGT-304 Principles of Management 3
BUMKG-330 Principles of Marketing 3
ECON-215 Principles of Economics II 3
ENGL-320 Business Writing or
ENGL-415 Technical Writing 3

Selective Courses — 18 credits

Remaining courses are chosen from a list of business management selectives provided by the program director.

Professional Investigation/Exposure

Students must attend at least one professional event per semester for two years. See advisor.

Program Requirements for the Information Assurance and Cyber Security Concentration

Total for Graduation ..... 120 credits
General Education ..... 42 credits
Major Studies ..... 78 credits

Program Requirements

General Education

42 credits required

A. Communication Skills — 8 credits

ENGL-101 Freshman English – Composition *or*
ENGL-111 Freshman English – Honors I 3
ENGL-102 Freshman English – Reading and Related Writing *or*
ENGL-112 Freshman English – Honors II 3
SPCOM-100 Fundamentals of Speech 2

B. Analytic Reasoning — 8 credits

CS-144 Computer Science I 3
MATH-156 Calculus and Analytic Geometry I 5

C. Health and Physical Education — 2 credits

Courses must be from areas of health, physical education or nutrition.

D. Humanities and the Arts — 9 credits

Courses must be from three areas including creative arts, history, literature, music appreciation, performing arts and philosophy.

E. Social and Behavioral Sciences — 9 credits

Courses must be from three or more areas including anthropology, economics, geography, political science, psychology and sociology.

F. Natural Sciences (with Lab) — 4 credits

G. Technology — 2 credits

Major Studies

78 credits required

Computer Science/Network Foundation — 36 credits

CS-145 Computer Science II 3
CS-244 Data Structures 4
CS-245 Introduction to Computer Organization 3
CS-248 Web and Internet Programming 3
CS-441 Computer Architecture 3
CS-442 Systems Programming 3
CS-443 Database Systems Manipulation and Design 3
CS-480 Introduction to Computer Security 3
ITM-133 Networking Fundamentals I 3
ITM-134 Networking Fundamentals II 3
ITM-383 Introduction to Network Security 3
MSCS-449 Applied Mathematics: Co-op Education Internship 2

Required Mathematics and Statistics — 30-33 credits

MATH-157 Calculus and Analytic Geometry II 5
MATH-158 Calculus III 3
MATH-180 Foundation of the Language of Mathematics 4
MATH-275 Linear Algebra 3
MATH-370 Modern Algebra I 3
MATH-371 Modern Algebra II 3
MATH-380 Cryptography 3
MATH-450 Real Analysis I 3
STAT-330 Probability and Mathematical Statistics for Engineering and the Sciences *or*
STAT-331 Probability and Mathematical Statistics I and
STAT-332 Probability and Mathematical Statistics II 3-6

Other Required Credits — 9-12 credits

ENGL-415 Technical Writing 3

Remaining courses are chosen from a list of information assurance and cyber security selectives provided by the program director.

Professional Investigation/Exposure

Students must attend at least one professional event per semester for two years. See adviser.

Program Requirements for the Software Development Concentration

Total for Graduation ..... 120 credits
General Education ..... 41-42 credits
Major Studies ..... 77-78 credits

Program Requirements

General Education

41-42 credits required

A. Communication Skills — 8 credits

ENGL-101	Freshman English – Composition *or*	
ENGL-111	Freshman English – Honors I	3
ENGL-102	Freshman English – Reading and Related Writing *or*	
ENGL-112	Freshman English – Honors II	3
SPCOM-100	Fundamentals of Speech	2

B. Analytic Reasoning — 7-8 credits

CS-144	Computer Science I	3
MATH-153	Calculus I *or*	
MATH-156	Calculus and Analytic Geometry I	4-5

C. Health and Physical Education — 2 credits

Courses must be from areas of health, physical education or nutrition.

D. Humanities and the Arts — 9 credits

Courses must be from three areas including creative arts, history, literature, music appreciation, performing arts and philosophy.

E. Social and Behavioral Sciences — 9 credits

Courses must be from three or more areas including anthropology, economics, geography, political science, psychology and sociology.

F. Natural Sciences (with Lab) — 4 credits

G. Technology — 2 credits

Major Studies

78-79 credits required

Required Computer Science — 30 credits

CS-145	Computer Science II	3
CS-244	Data Structures	4
CS-245	Introduction to Computer Organization	3
CS-441	Computer Architecture	3
CS-442	Systems Programming	3
CS-443	Database Systems Manipulation and Design	3
CS-448	Software Engineering	3
CS-458	Advanced Software Engineering	3
MSCS-390	Algorithms and Artificial Intelligence	3
MSCS-449	Applied Mathematics: Co-op Education Internship	2

Required Mathematics and Statistics — 26-30 credits

MATH-154	Calculus II or	
MATH-157	Calculus and Analytic Geometry II	4-5
MATH-158	Calculus III	3
MATH-180	Foundation of the Language of Mathematics	4
MATH-275	Linear Algebra	3
MATH-370	Modern Algebra I	3
MATH-450	Real Analysis I	3
MSCS-446	Numerical Analysis I	3
STAT-330	Probability and Mathematical Statistics for Engineering and the Sciences or	
STAT-331	Probability and Mathematical Statistics I and	
STAT-332	Probability and Mathematical Statistics II	3-6

Selective Courses — 18-21 credits

ENGL-415	Technical Writing	3

Remaining courses are chosen from a list of software development selectives provided by the program director.

Professional Investigation/Exposure

Students must attend at least one professional event per semester for two years. See adviser.